Some Insect Updates

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A Quick Review of Some 2019 Activities

- Update on Biological Control of Japanese Beetle project
- A trial to control Rose Midge
- An interesting new disease of hemp, Beet Curly Top
Japanese Beetle Biological Control Program
Natural Enemies of Japanese Beetle Exist Elsewhere in the US

- **Paenibacillus popilliae** *(Milky spore)*
  - Bacterium
- **Istocheta aldrichi***
  - Tachinid fly
- **Tipha species***
  - Parasitic wasps
- **Ovavesicula popilliae***
  - Microsporidium (fungus)

*Species involved in Colorado Japanese Beetle Biological Control Program
Natural Enemies of Japanese Beetle for Potential Introduction into Colorado?

*Tipha vernalis* (Spring Tipha) – parasitoid was of late stage Japanese beetle grubs

Photograph by David Shetlar, The Ohio State University
Adults of the Spring Tiphia emerge in May. The adults feed on nectar and honeydew.

The availability of nearby sources of nectar and honeydew is important in the success of this insect as a biological control of Japanese beetle.
A source of spring tiphia was developed in 2019, near Lexington, Kentucky.
The 2019 wasps were released at a golf course site in Boulder. This site was chosen since it had high numbers of grubs and nearby sources of nectar and honeydew.
Female wasps dig into the soil to locate Japanese beetle grubs that are nearly full-grown.

They then lay an egg on the grub.

The developing larva of the wasp feeds on and kills the grub.

It then pupates. The adult emerges next spring.
Status of *Tiphia vernalis* Releases

- **Boulder**
  - 1 Release Site (2019)
- **Littleton (CDA)**
  - 1 Release Site (2018, 2019)
Natural Enemies of Japanese Beetle for Potential Introduction into Colorado?

*Istocheta aldrichi* – tachinid fly parasitoid of Japanese beetle adults
Istocheta aldrichii requires accessible nectar/pollen resources when the adults are active – late June-July.
Istocheta aldrichii ("winsome fly") lays eggs on adult Japanese beetles in July.
The egg(s) hatches and the larva of the fly enters the beetle. Ultimately the beetle is killed. The larva then migrates out of the beetle and moves into the soil where it pupates. The adult emerges the following year.
Status of *Istocheta aldrichii* Releases

- **Boulder**
  - 1 Release Site (2019)

- **Pueblo**
  - 1 Release Site (2018)

- **Denver/Littleton**
  - 2 Release Sites (2018)
Natural Enemies of Japanese Beetle for Potential Introduction into Colorado?

*Ovavesicula popilliae* – a microsporidian (fungal) disease of Japanese beetle larvae

Main observed effects from infection – reduced fecundity, reduced winter survival

*Ovavesicula* infection of Malpighian tubules of Japanese beetle larva
The Malpighian tubules of insects filter wastes from the blood, functioning somewhat like what the kidney does in humans.
Heavy *O. popilliae* infection of Malpighian tubules of Japanese beetle

Source: David Smitley, Michigan State University
Status of *Ovavesicula popillae* Releases

- **Boulder**
  - 1 Release Site, 2015)
  - Confirmed established
- **Pueblo**
  - 3 Release Sites (2015, 2018)
- **Denver/West Arapahoe Counties**
  - 6 Release Sites (2018)
If the Japanese Beetle Biological Control Project works, what would be considered success?

In 10-15 years there would only be three Japanese beetles on your rose, instead of ten.
A trial to find a rose midge control product
A tiny fly that damages the developing flower buds of rose
The adult midge lays eggs on developing shoots, flower buds.

Rose midge larvae are tiny cream colored maggots that slash the buds as they feed.
This results in a variety of symptoms that produce destruction or distortion of developing flower buds.
A site was identified in 2019 for a trial to determine if any of the newer insecticides available to a rose grower might be effective for control of rose midge.

Dave Ingram of the Denver Rose Society was partnered on this project.
The products chosen had to be available for retail sale, have high safety to bees, and were known to be effective against some kinds of other fly/midge pests.
## Results

<table>
<thead>
<tr>
<th>Treatment</th>
<th>No. Damaged Terminals/Plants</th>
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<tbody>
<tr>
<td>Spinosad</td>
<td>0.85</td>
</tr>
<tr>
<td>Acetamiprid</td>
<td>0.85</td>
</tr>
<tr>
<td>Untreated Check</td>
<td>2.85</td>
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</tbody>
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**Bottom Line:** Both treatments tested provided about 70 percent control.
Description of a new virus disease of hemp
Newly identified insect-vectored pathogen of hemp – beet curly top virus

Beet curly top virus is transmitted to plants by the beet leafhopper (*Neoaliturus tenellus*)

Beet curly top symptoms on sugarbeet (above) and tomato (below)

Photo by A.C. Magyarosy, Bugwood.org
Beet Curly Top Virus produces a wide variety of symptoms on hemp.
A slight chlorosis of the base of leaves, with some mosaic pattering was seen on all plants to some extent
“Classic” Symptoms
Twisting and curling of new growth developed on many plants
A “Trifecta” of symptoms
Original main stem shows strong symptoms

Side shoots develop that are generally healthy looking

A very odd symptom:
Bisymptomatic Plants
Beet Curly Top outbreaks are common in western Colorado. The main crops affected are tomatoes, peppers, squash and beans.

The only way a plant gets infected with this disease is if a beet leafhopper, which has previously fed on a BCTV-infected plant, feeds on the plant.

Essentially all BCTV infections occur from beet leafhoppers, carrying the virus, which migrated into the area in late spring from New Mexico/Arizona.

Beet leafhopper spends very little time in hemp and does not breed in the crop. It can transmit the virus after feeding for 10-15 minutes.
Bob Hammon with the Tri-River Extension office spent many years researching all the available options to manage beet curly top on tomatoes.

Results of this work can be found at the Western Colorado Insects website of the Tri-River Area Extension offices.
Mulch and Insects

• Mulches can:
  – alter light around plants
  – affect temperatures on plants
  – provide cover for insects around the base of the plants

Figure 1. Tomato planted on metalized vs. black plastic mulch (back - right).
Reflective Mulches for Control of Insect Vectored Plant Diseases

- Aphids
- Thrips
- Leafhoppers
Thank you!

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For more information on Colorado Insects check out the CSU Insect Information Website
For more information on Hemp Insects check out the CSU Hemp Insect Website